WATER RESOURCES SIMULATION MODEL FOR RIVER BASINS OF THE STATE OF TAMILNADU IN INDIA – MANUAL

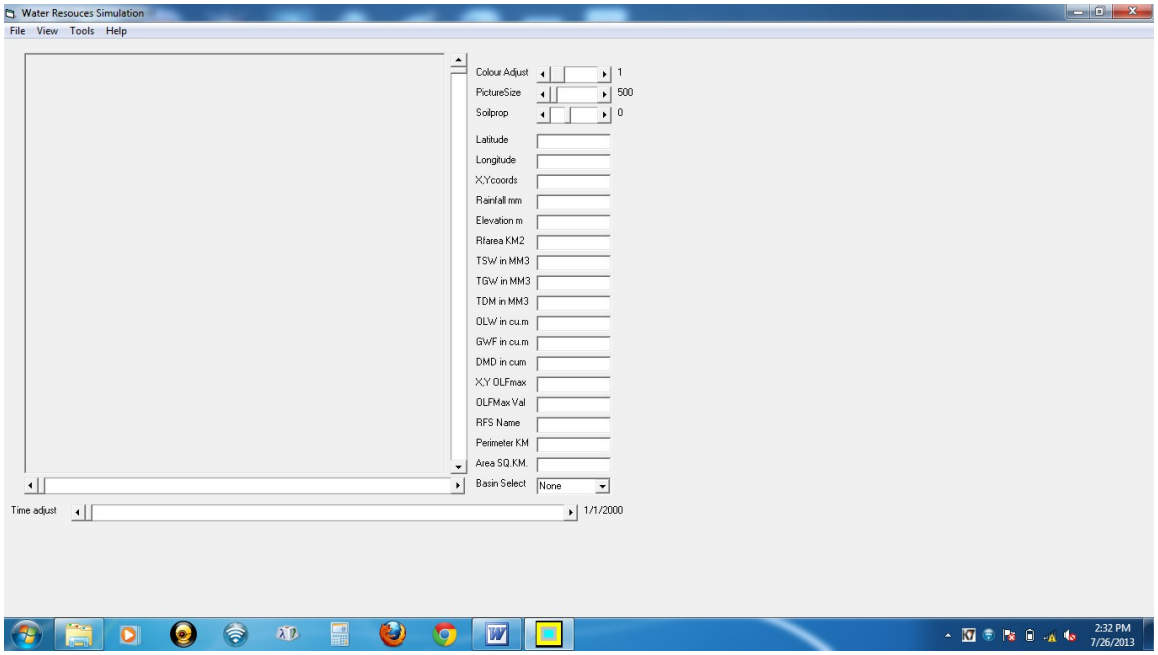
The software contains Manual in PDF format, Reference manual in DOC format, All data files in DSS.rar and Main executable file WRSMRFS.EXE. All the files can be downloaded from following link.

THE SOFTWARE MAY BE DOWNLOADED WITH THIS LINK

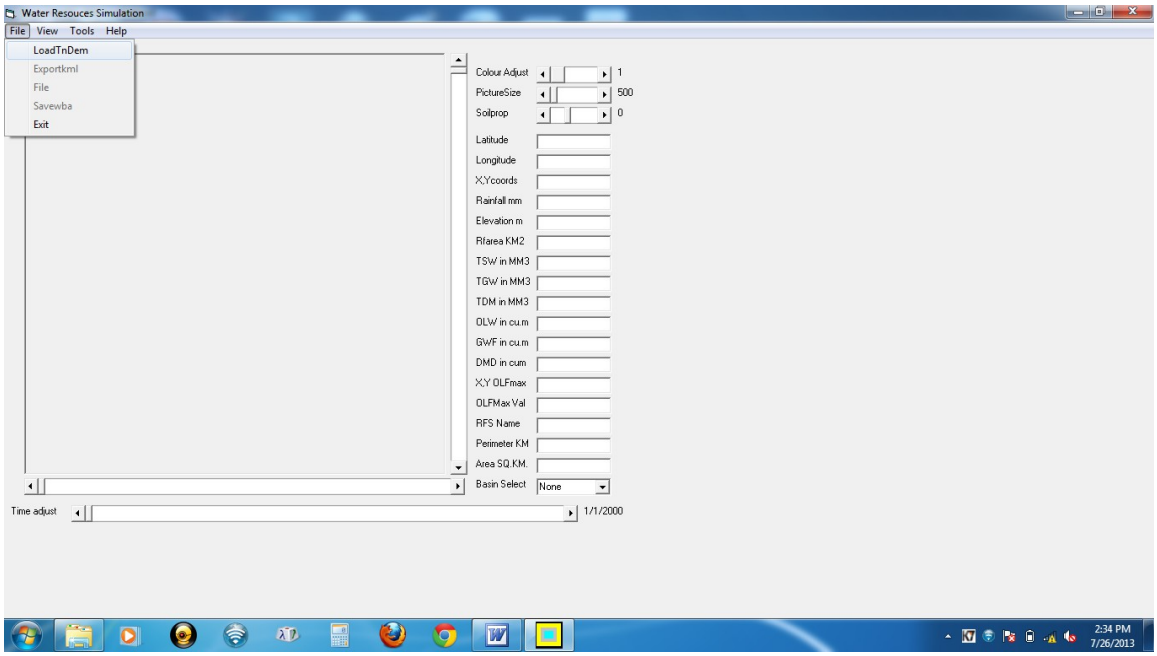
1.DOWNLOAD THE file DSS.rar from the above link and UNZIP it and save all the files in a seperate folder as C:\DSS. The Revised main executable file "WRSMRFS.EXE" may also be downloaded and stored as "C:\DSS\WRSMRFS.EXE".

2. NOW Run the program WRSMRFS.exe

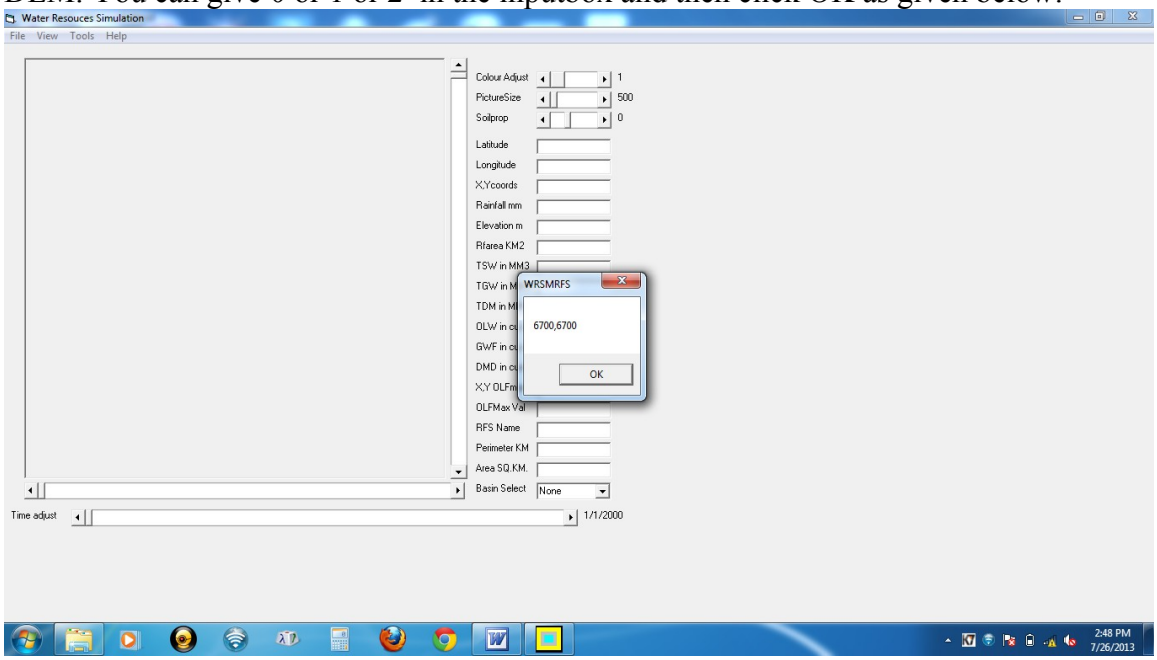
3.YOU WILL SEE THE SCREEN AS BELOW:

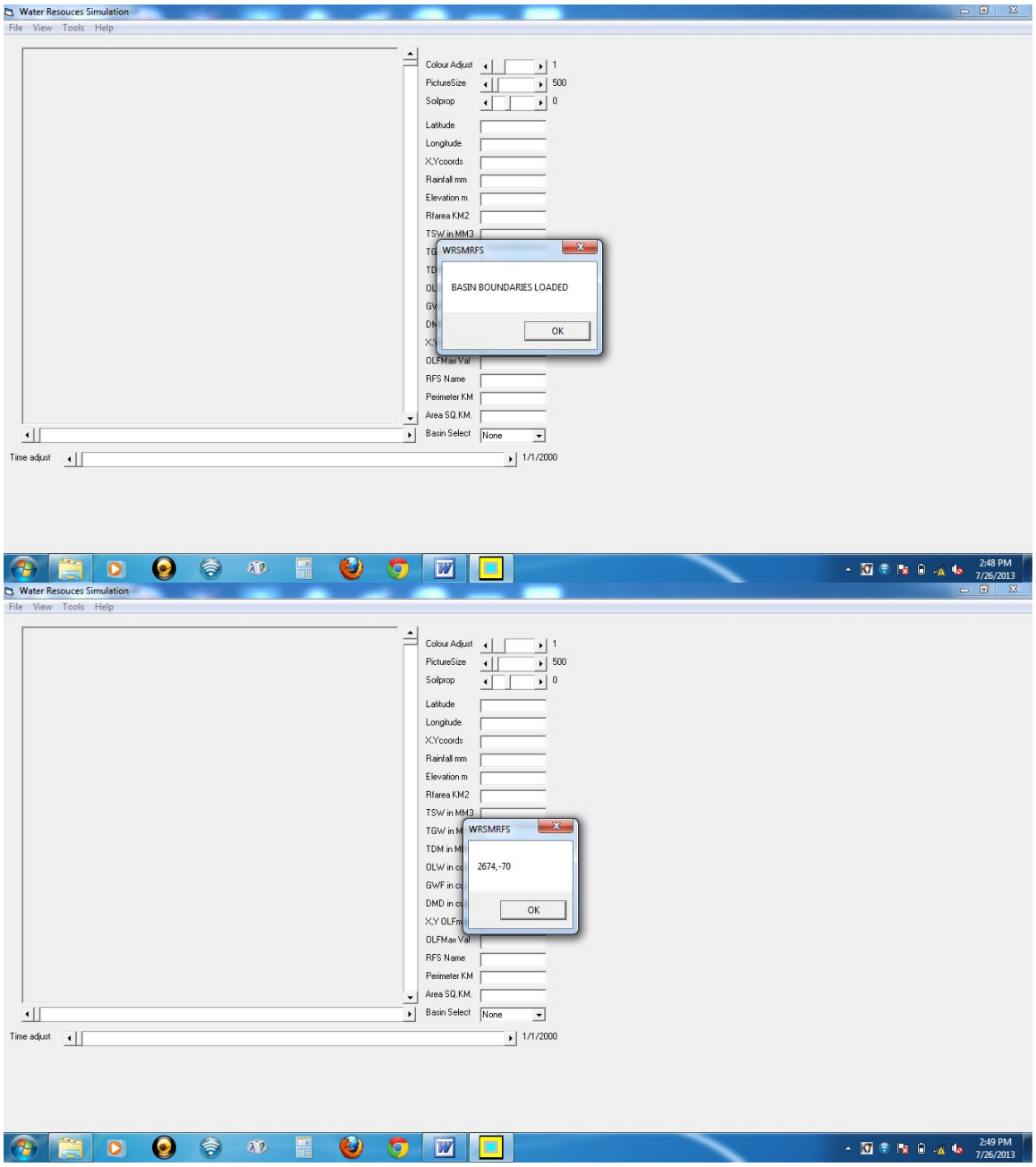


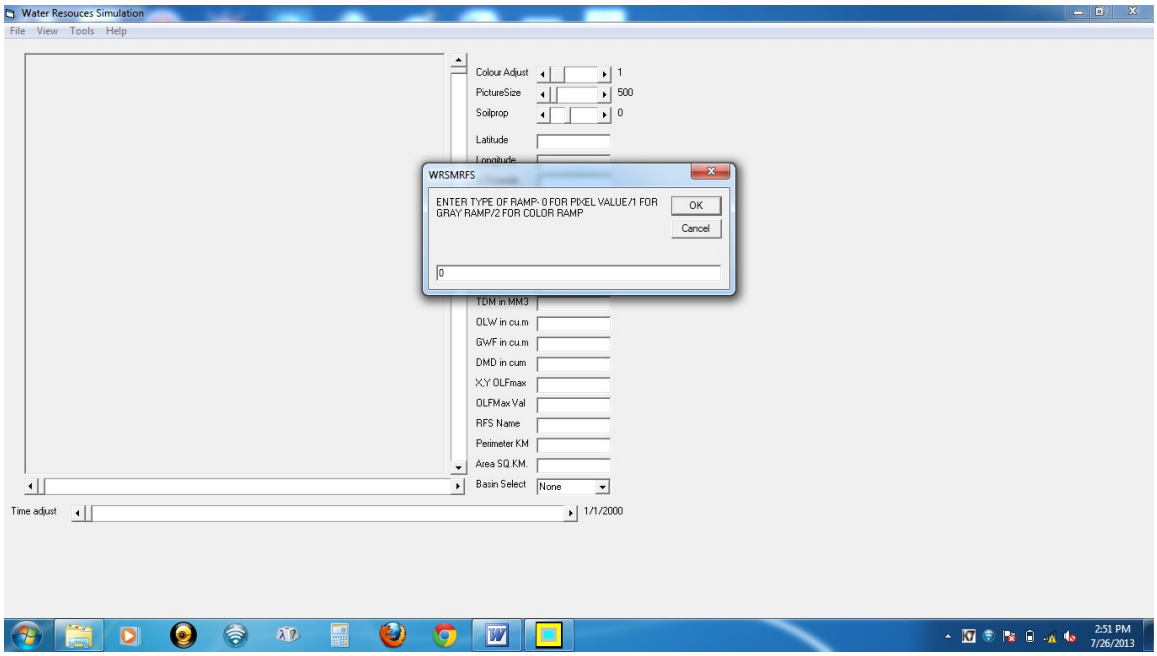
4.FROM THE FILE MENU CLICK ON LoadTnDem as shown below:



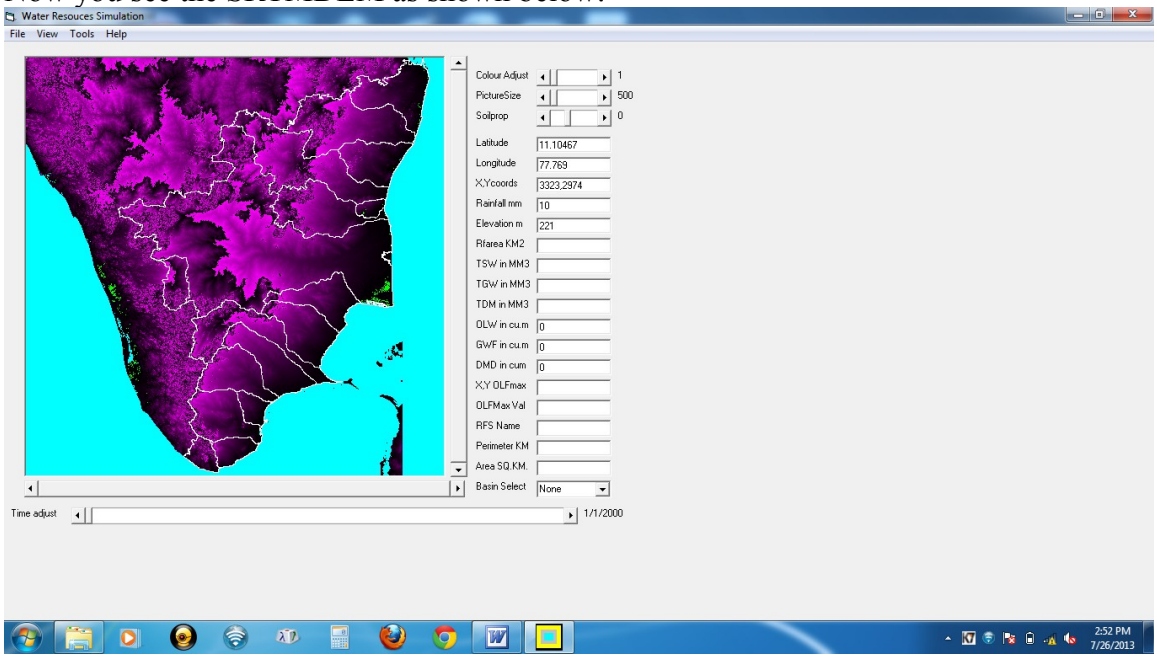
Now the SRTM Digital Elevation Model with basin boundaries of Tamilnadu is loaded.In the mean time you will see 3 message boxes showing “6700,6700” which means total horizontal and vertical pixels taken from SRTMDEM, “BASIN BOUNDARIES LOADED” which means the 17 Basin Boundaries of Tamilnadu is loaded, “2674,-70” which means the Maximum, Minimum Elevation in the area Considered. Simply Click OK for those message boxes. Then you will see a InputBox to feed the type of Ramp for DEM. You can give 0 or 1 or 2 in the inputbox and then click OK as given below:




Water Resouces Simulation
File View Tools Help
Colour Adjust 1
PictureSize 500
Soilprop 0
Latitude
Longitude
X,Ycoords
Rainfall mm
Elevation m
Rfarea KM2
TSW in MM3
WRSMRFS
BASIN BOUNDARIES LOADED
OK
OLFMax Val
RFS Name
Perimeter KM
Area SQ.KM.
Basin Select None
Time adjust 1/1/2000
2:48 PM
7/26/2013
Water Resouces Simulation
File View Tools Help
Colour Adjust 1
PictureSize 500
Soilprop 0
Latitude
Longitude
X,Ycoords
Rainfall mm
Elevation m
Rfarea KM2
TSW in MM3
WRSMRFS
2674,-70
OK
OLFMax Val
RFS Name
Perimeter KM
Area SQ.KM.
Basin Select None
Time adjust 1/1/2000
2:49 PM
7/26/2013



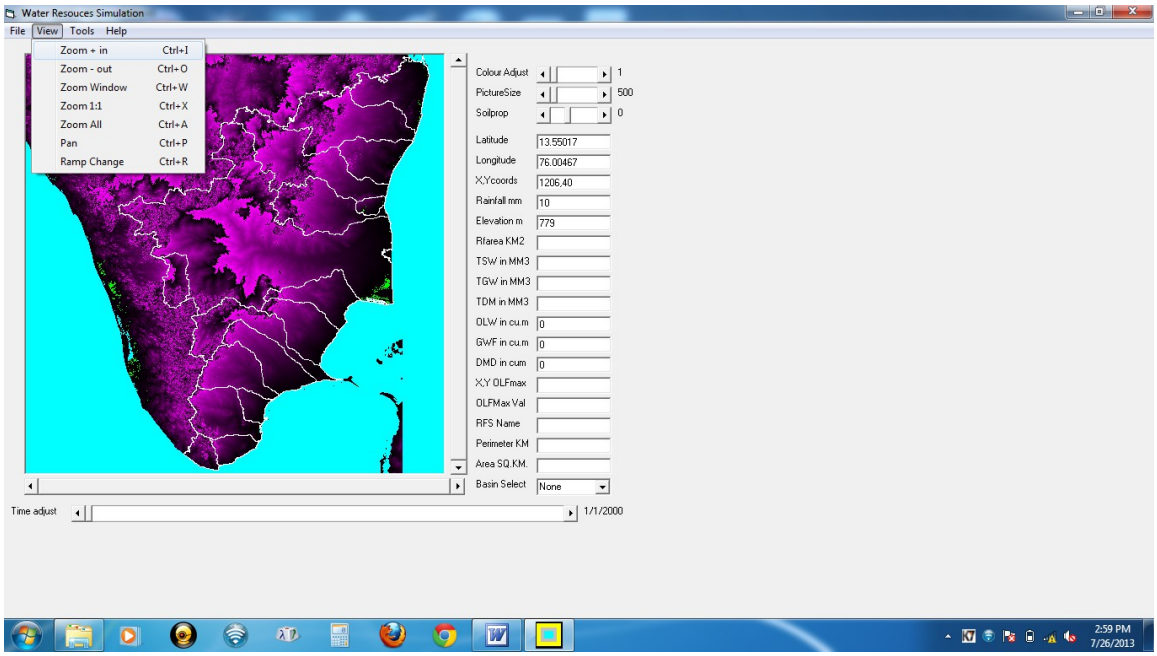
Now you see the SRTMDEM as shown below:



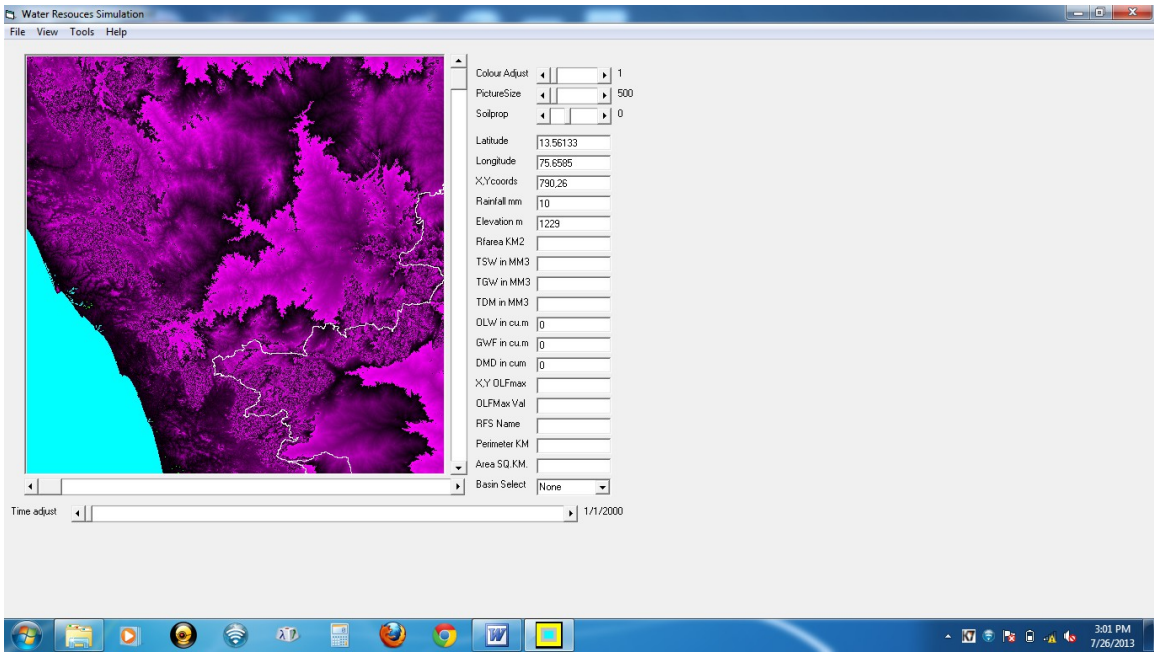
If you move the mouse on the image area you will see the corresponding Latitude, Longitude, X-Y coordinates. Elevation in Metres above MSL. If you move the mouse over sea area in cyan color you will see the Elevation as -9999 as per SRTMDEM standards.

5.VIEW COMMANDS:

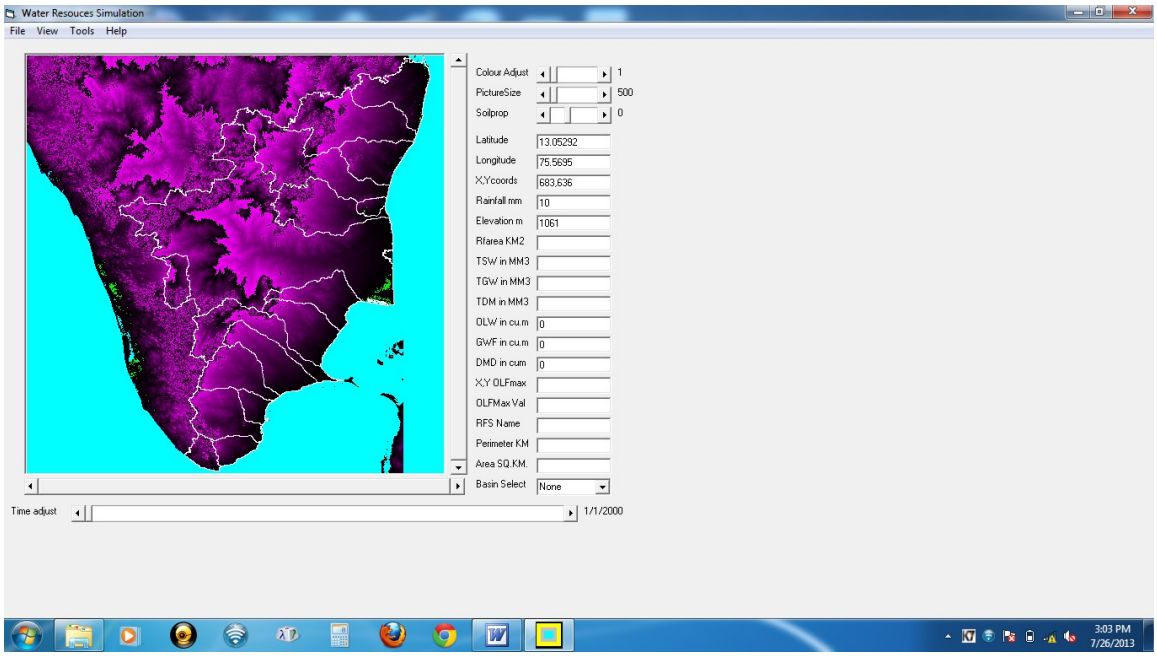
If you want to Zoom and Pan you can pick from the View menu as given below:



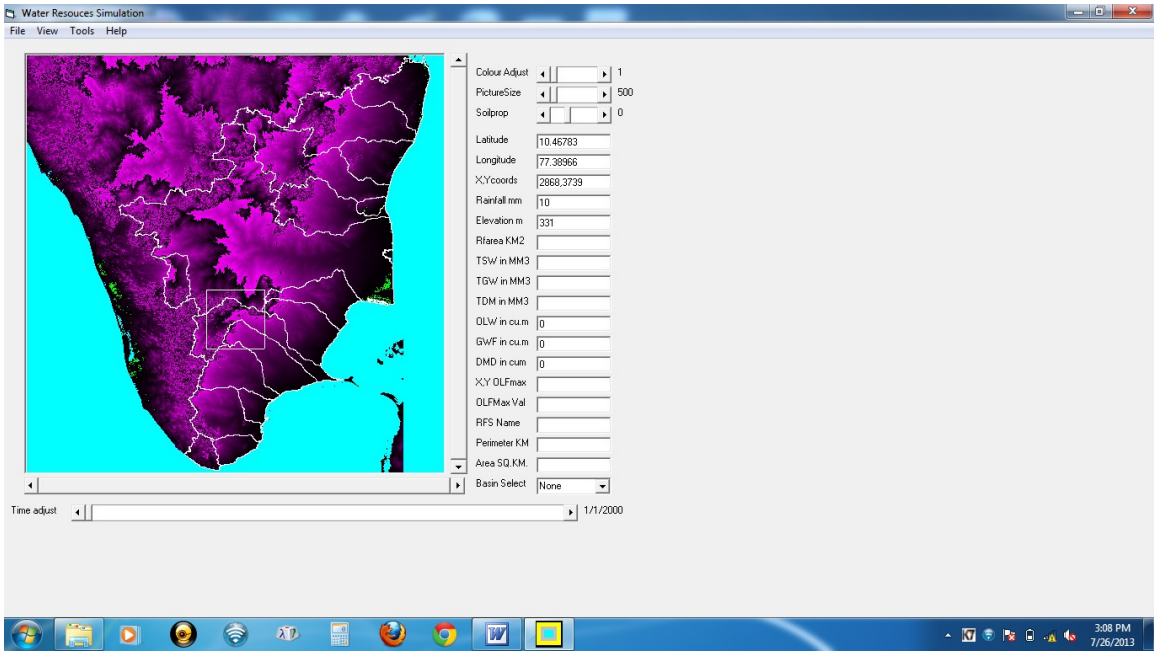
The shortcut for Zoom+ in is Ctrl + I. You can see the Zoom+ in as below:



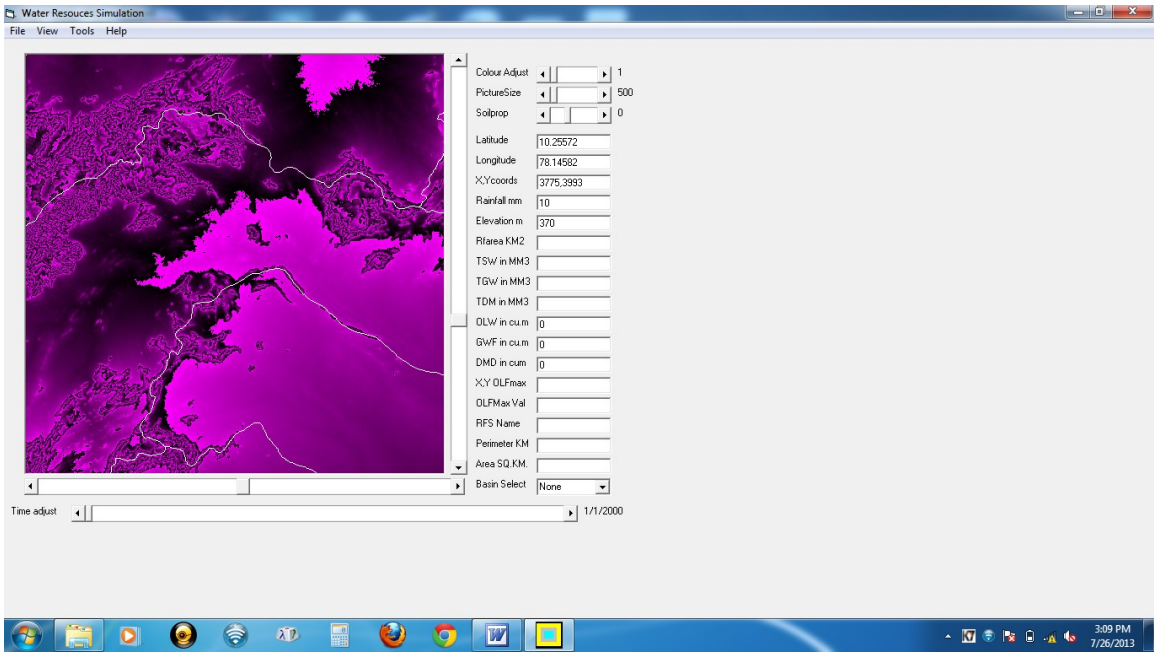
You can select Zoom- out or Ctrl + O will show as given below:



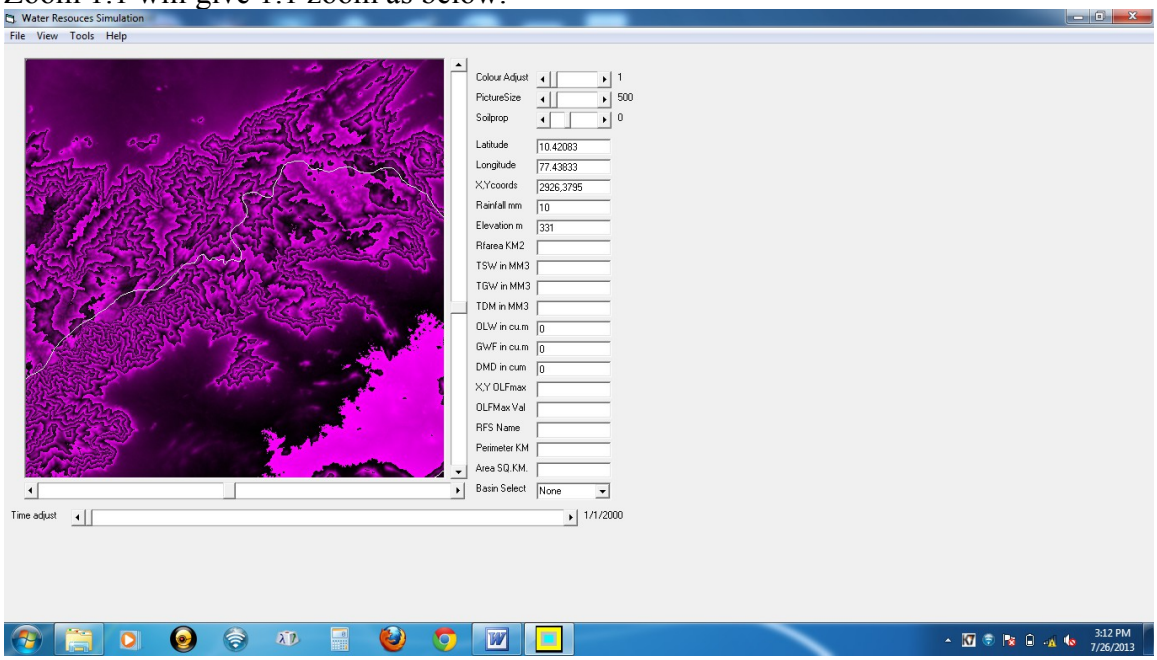
You can use Zoom Window to zoom and view a particular area.Use mouse down at start point and mouse up to finish zoom area and you will see a rectangle when selecting zoom area as shown below.



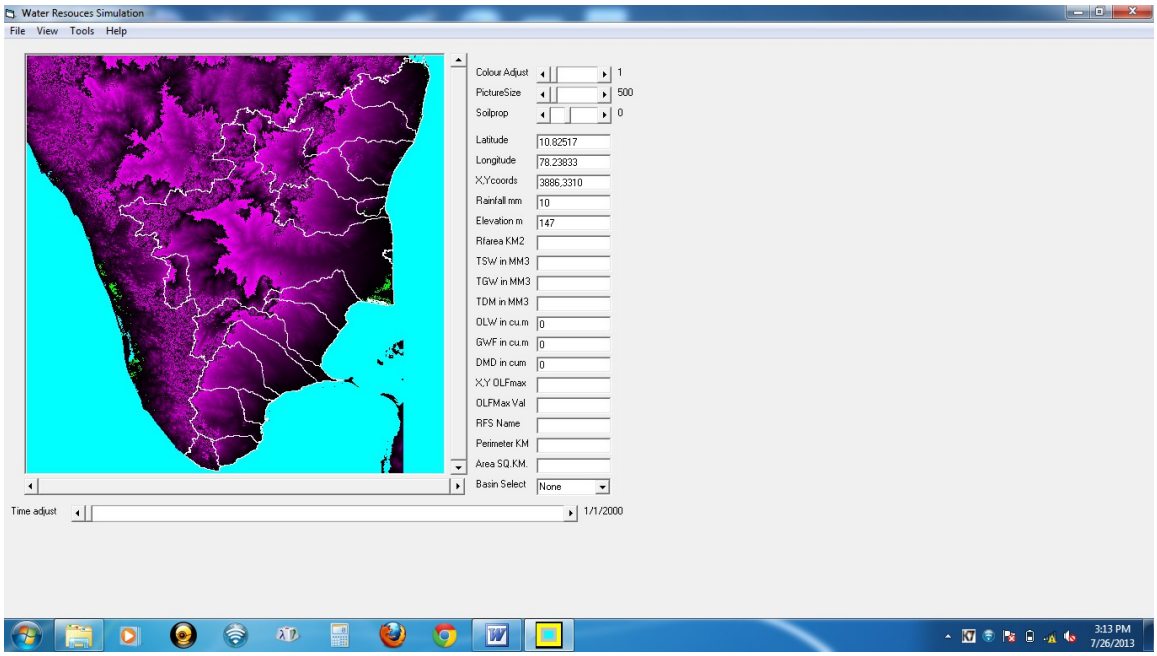
Now you will see the zoom window area as below.



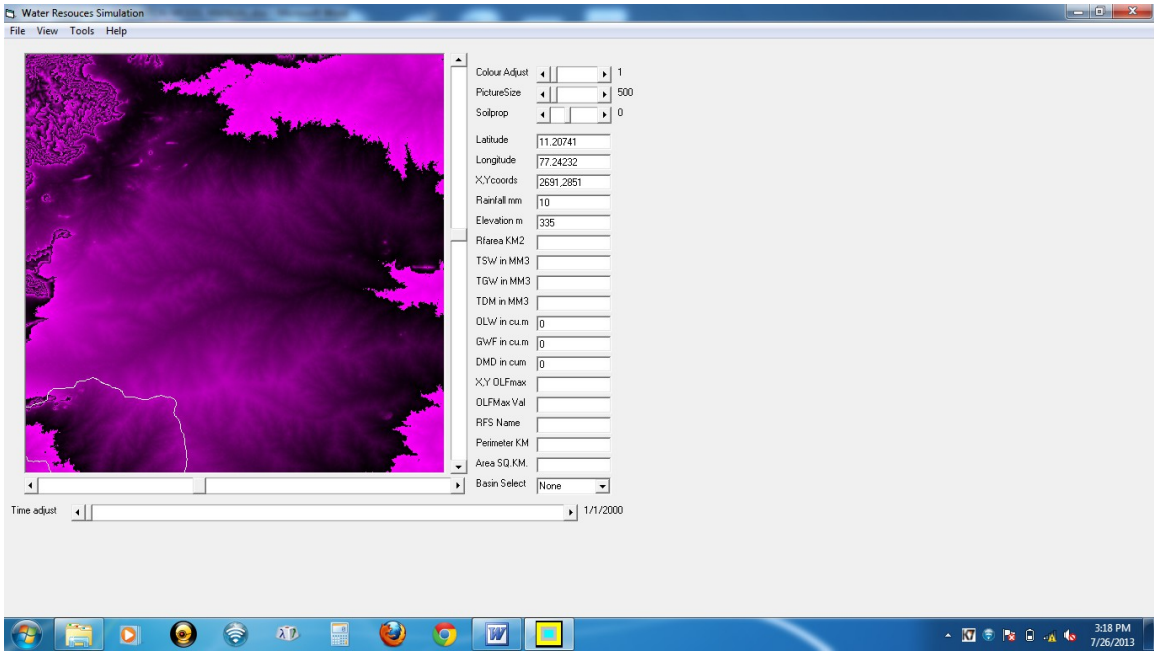
Zoom 1:1 will give 1:1 zoom as below.



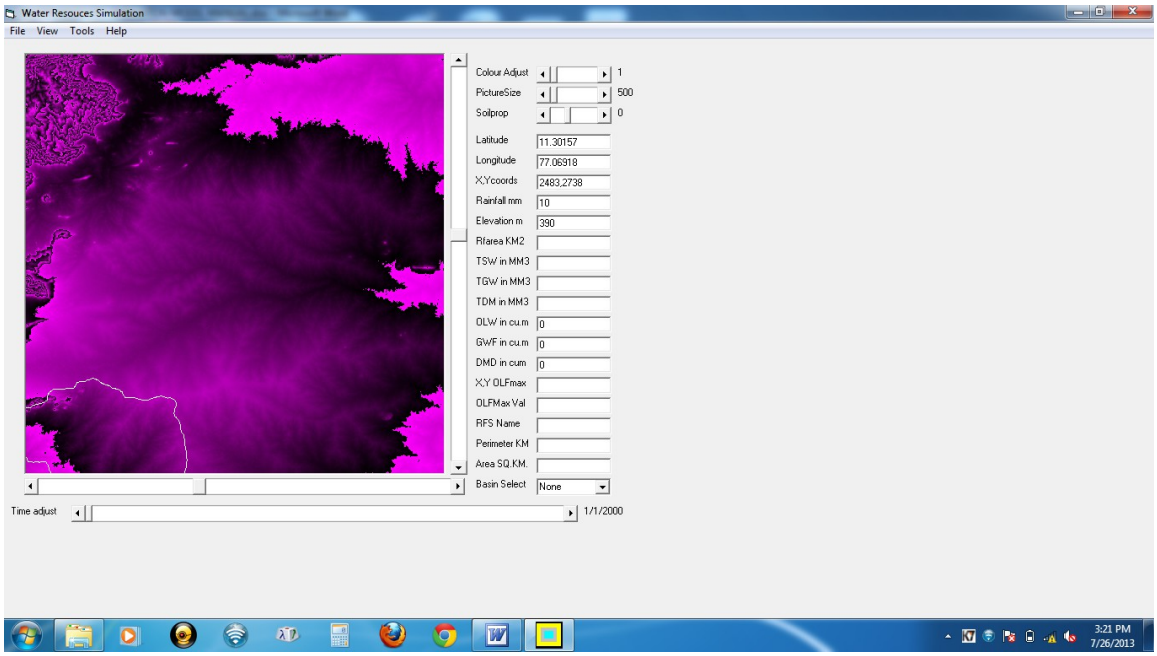
ZoomAll or ctrl+A will give Zoom all view as below.



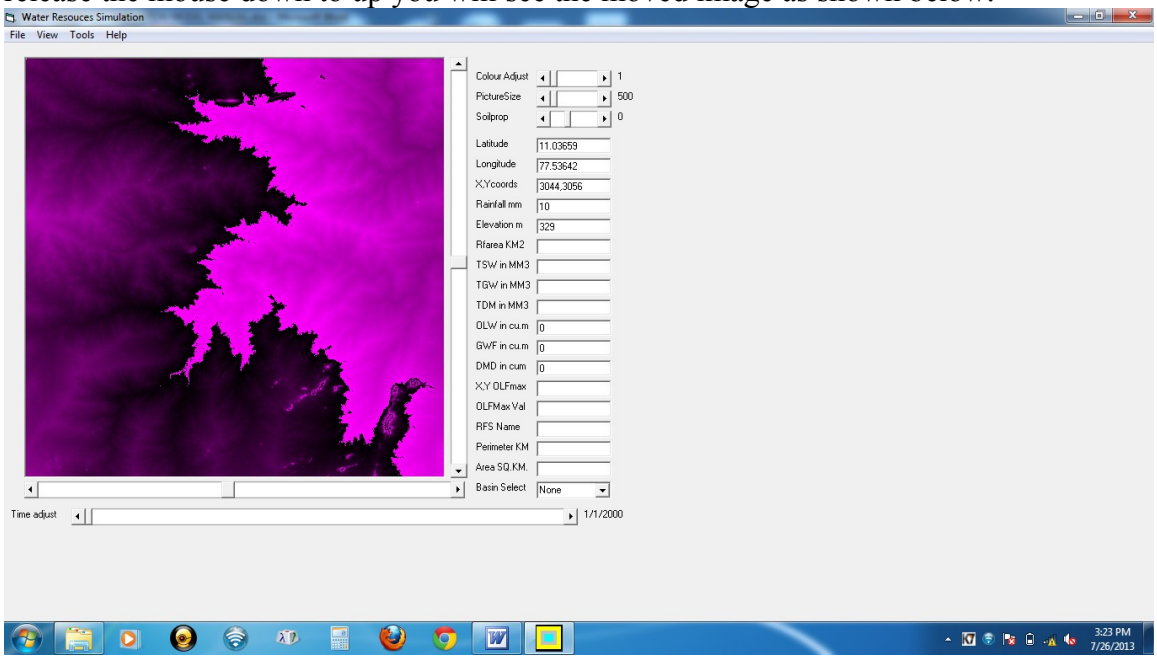
Zoom Window or Ctrl+W is used for zooming some portion of the graphical area as shown below.



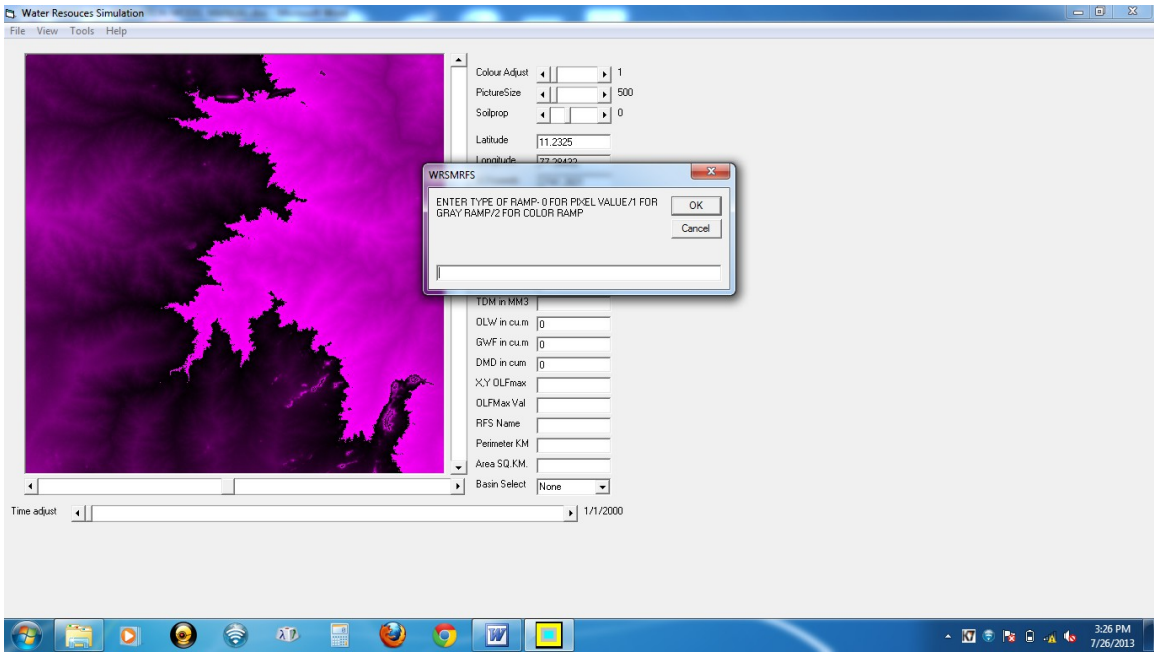
Now use the Pan or Ctrl+P to view the adjacent area by dragging mouse with mouse down in graphical area as shown below.



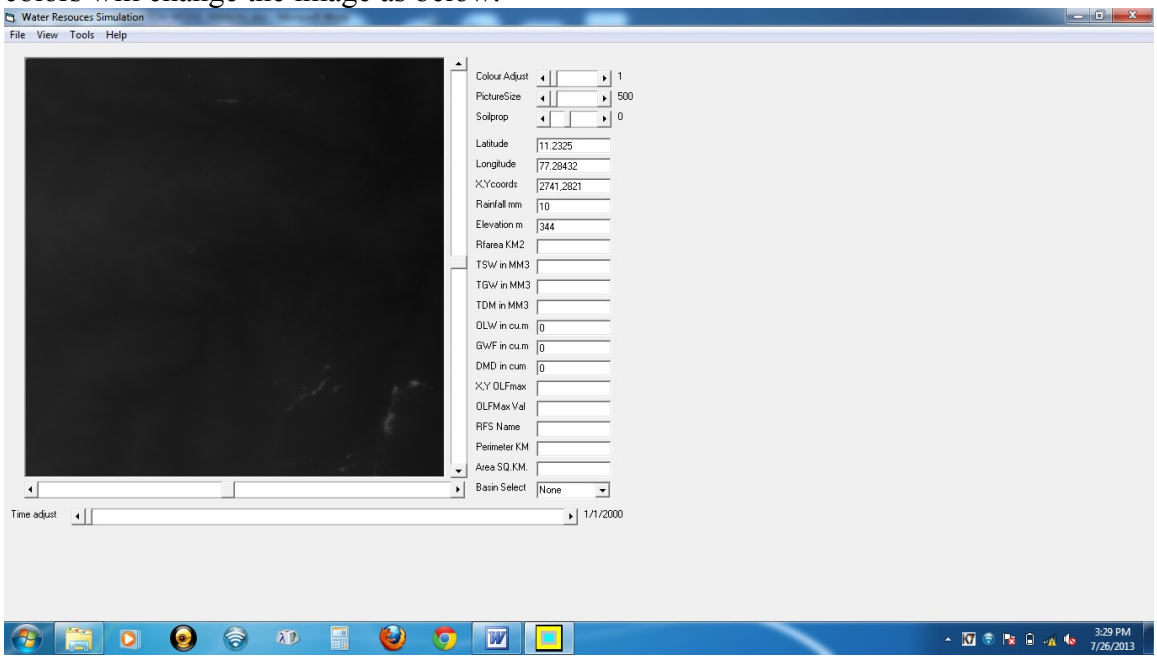
You wll see the + shaped curser when you drag the mouse on the screen. When you release the mouse down to up you will see the moved image as shown below.



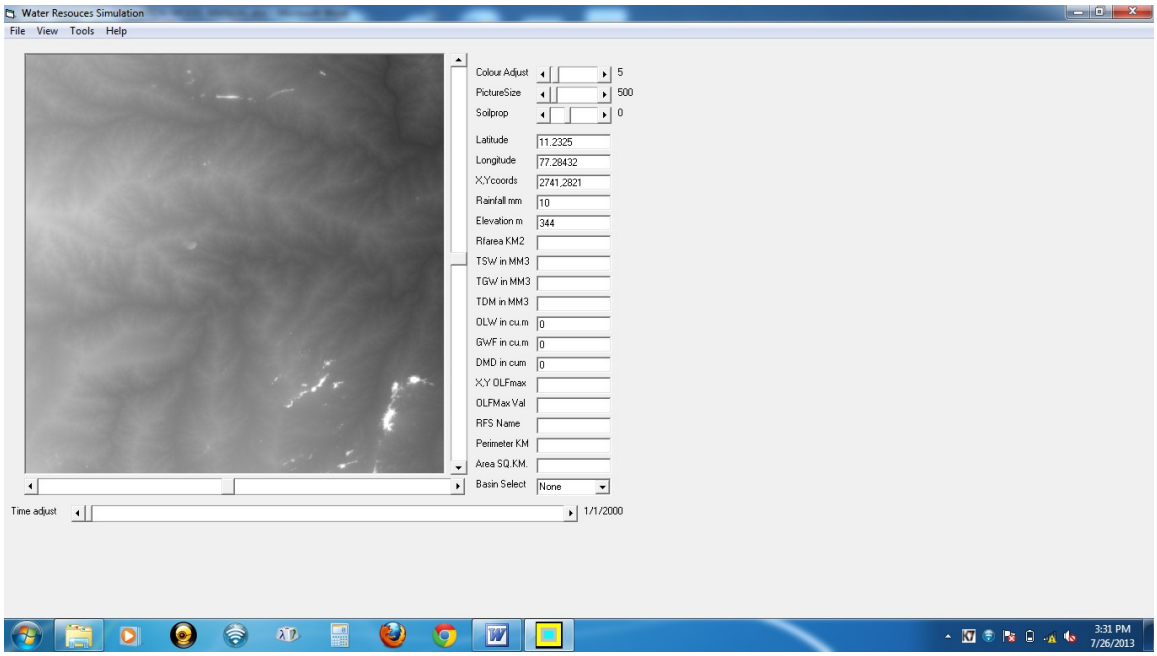
Ramp Change (Ctrl+R) is used for changing Colors in DEM in different modes as shown below.



Since we are in Ramp Type -0, now you give 1 to the above inputbox to see the change in colors will change the image as below.

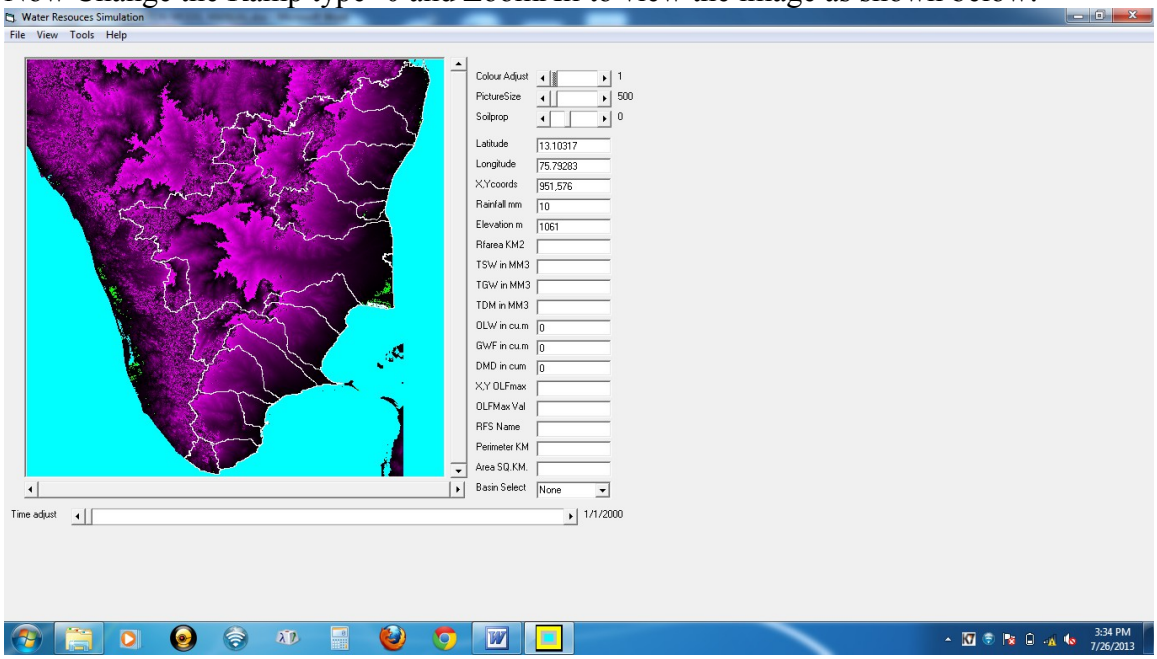


To improve the color representation in this mode, you can use the color adjust slide bar as shown below.



You can use color adjust slide bar in all Ramp types.

Now Change the Ramp type -0 and ZoomAll to view the image as shown below:



6.Tools menu Commands:

Before going into the tools menu commands it is better to know the other properties on the Right side and bottom of the graphical area.

The bottom slide bar is the Time step or Time Series slide bar. The date at the End of slide bar shows the Current Date of simulated model. The default value shows the Start date of the model.

The Combo Box/List Box Adjacent to [Basin Select] is used for Selection of Basin for Simulation Model and all the 17 Basin Names in Tamilnadu are available in that list box.

The text box adjacent to [Area in SQ.KM] will show the Area of Selected Basin in SQ.KM.

The text box adjacent to [Perimeter KM] will show the Perimeter of Basin Boundary in KM.

The text box adjacent to [RFS Name] will show the Name of the Catchment/ SubBasin/ Rainfall Station Name influencing the Area where the mouse or cursor is moved on.

The text box adjacent to [OLFMax Value] will show the Critical Value in CU.M. stored in Critical Location where the maximum stagnation or flooding will occur.

The text box adjacent to [X,Y OLFMax] will show the X-Y Coordinate of Maximum flood occurance.

The text box adjacent to [DMD in Cum] will show the Demand per Day in CU.M. for the current cell over the mouse of 90mX90m area.

The text box adjacent to [GWF in Cum] will show the availability of Ground Water in CU.M. on that day for the current cell over the mouse of 90mX90m. The negative value shows the availability below the critical value.

The text box adjacent to [OLF in Cum] will show the availability of Surface Water/ Over Land Water available for the current cell over the mouse of 90mX90m area (The surface water available near by reservoirs/tanks contributing to the current cell over the mouse is shown here) .

The text box adjacent to [TDM in MM3] will show the Total Demand in Million Cubic Metres per day for the Catchment/SubBasin/Rainfall Station over the mouse.

The text box adjacent to [TGW in MM3] will show the Total Ground Water Available in MM3 for the Catchment/SubBasin/Rainfall Station influencing the area over the mouse (The Name of Rainfall Station will be shown in text box adjacent to [RFS Name]).

The text box adjacent to [TSW in MM3] will show the Total Surface Water Available in MM3 for the Catchment/SubBasin/Rainfall Station influencing the area over the mouse.

The text box adjacent to [RFarea KM2] will show the Area of Catchment/ SubBasin/ Rainfall Station Influencing the area in Square Kilometres.

The text box adjacent to [Elevation m] shows the Elevation of the current cell over the mouse in Metre above MSL.

The text box adjacent to [Rainfall mm] will show the Rainfall in mm as per Time series per day during simulation period. (Before Water balance it will show 10 or 0).

The text box adjacent to [X,Y Coordinates] will show the X,Y location of current cell and each cell is 90mX90m Size assuming upper left corner as 1,1 and lower right corner as 6700,6700.

The text boxes adjacent to [Latitude] and [Longitude] will show the Latitude and Longitude of the mouse location in decimals.

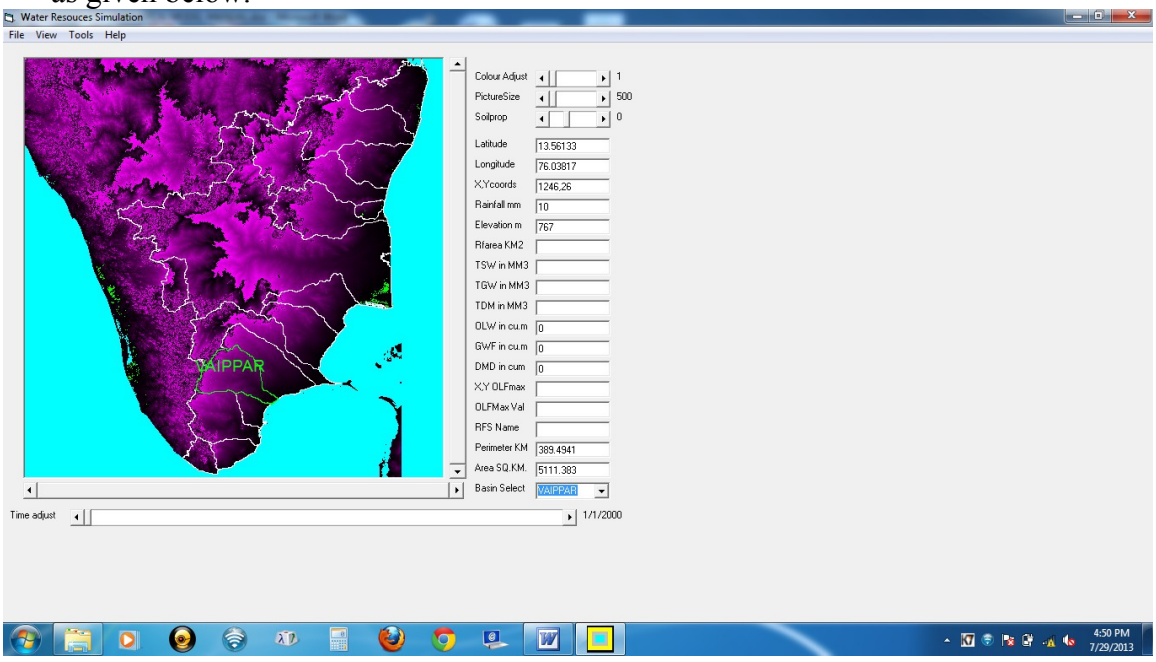
The text box adjacent to [Soilprop] shows the soil type between -5 to 10 which represents 5% to 20% Specific storage correspondingly. The value of 0 represents 10% specific storage capacity of Ground Water.

The slide bar adjacent to [PictureSize] represents the size of Graphical area in pixels. Default is 500x500 pixels. The size of the Picture box can be adjusted by increasing slide bar to 600x600 or more as per Screen Size Available.

The Silde bar adjacent to [Color Adjust] is used for Adjusting Colors such as Brightness and contrast.

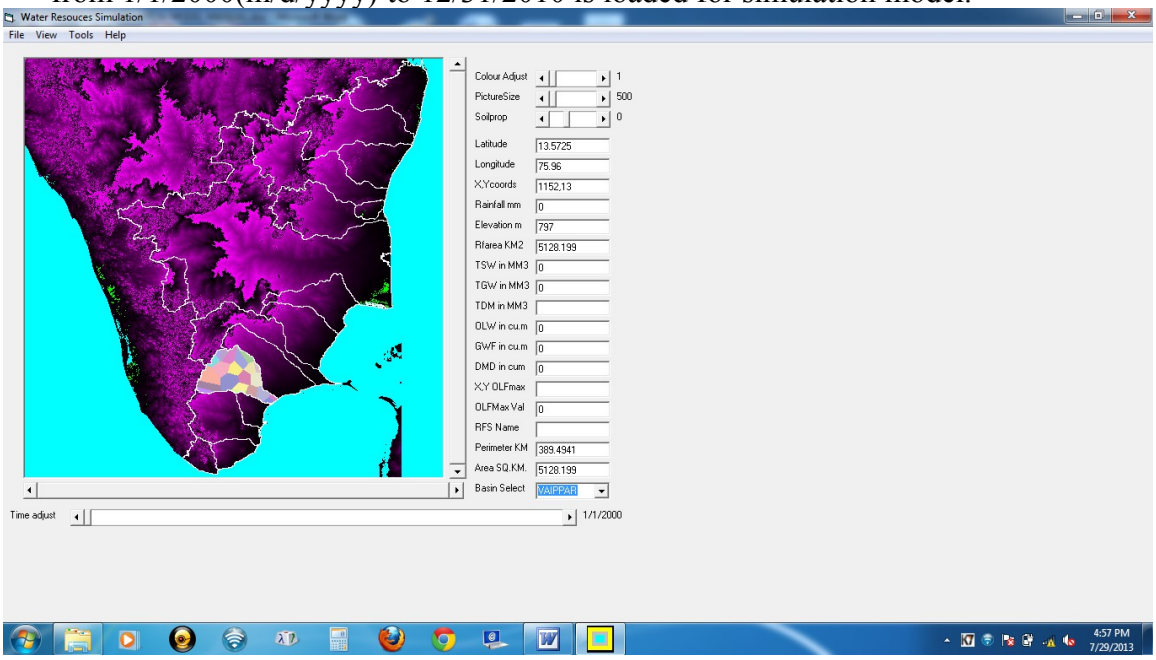
<u>Running the Simulation Model for VAIPPAR BASIN:</u>

1. From the Combo box adjucent to [Basin Select] Select VAIPPAR.
2. In the graphical area the VAIPPAR BASIN boundary will be selected and shown as given below.

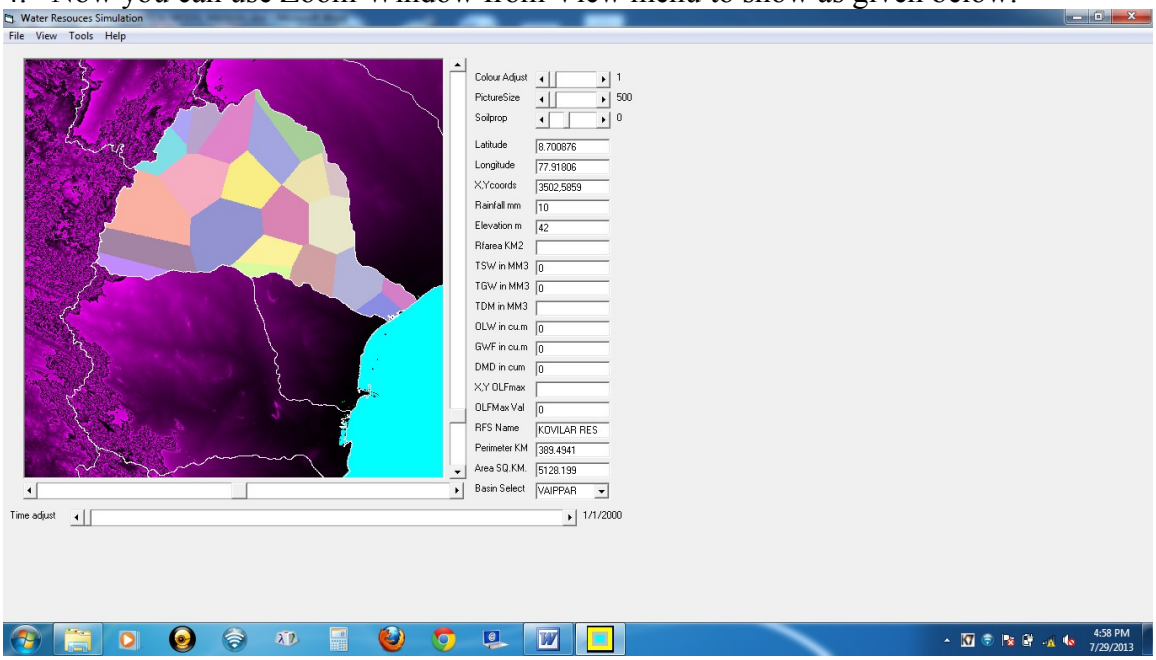


3. From the tools menu ckick the Rfload, now the time series of rainfall data of all rainfall stations will be loaded and shown as given below. Clock OK for the

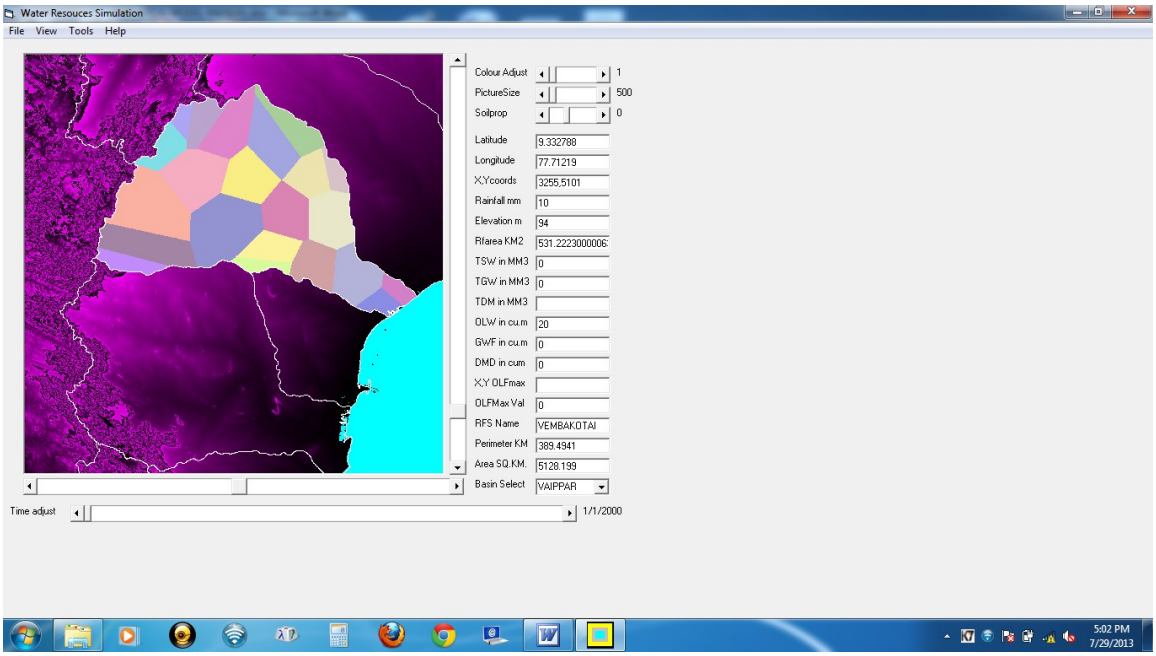
message box showing “22” which represents that 22 Rainfall Time Series data from 1/1/2000(m/d/yyyy) to 12/31/2010 is loaded for simulation model.



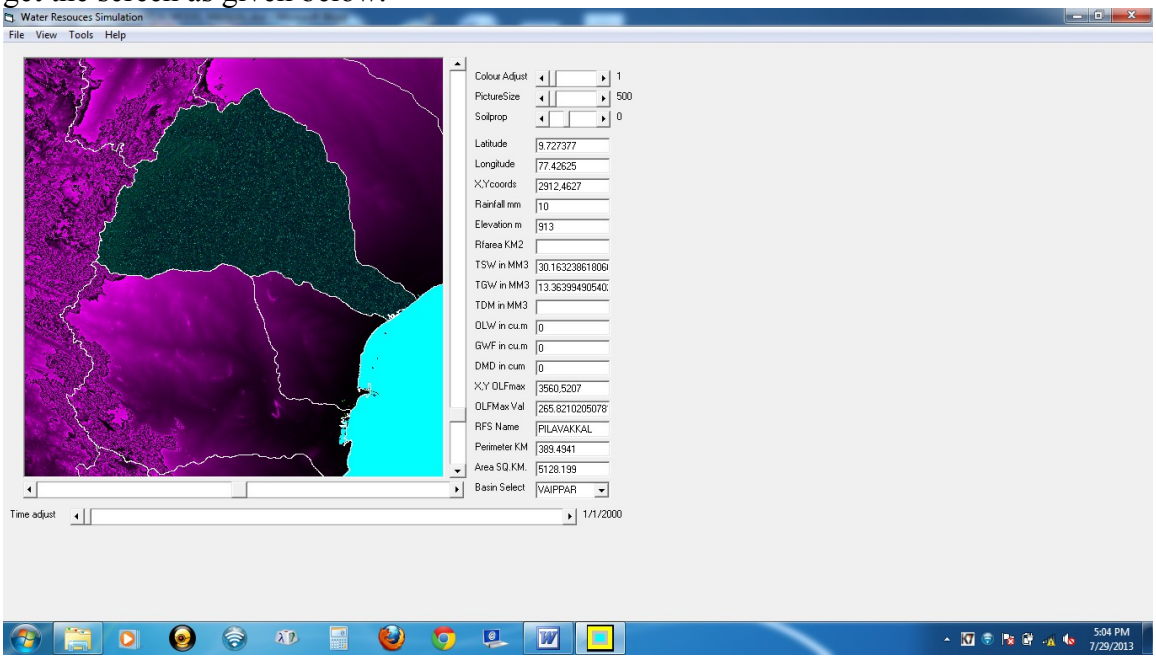
4. Now you can use Zoom Window from View menu to show as given below.



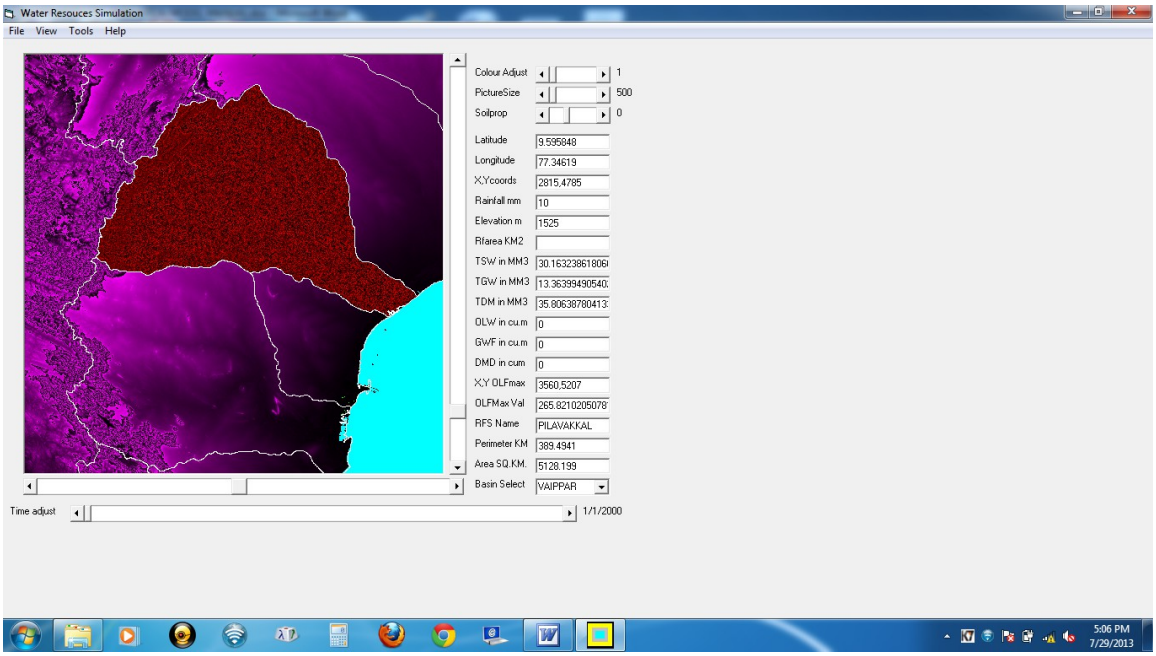
5.When you move the mouse over the vaippar basin area shown in 22 different colors you will see the corresponding Rainfall station name in the text box adjacent to RFSName and text box adjacent to RFArea will show the influence area of that Rainfall station as shown below.



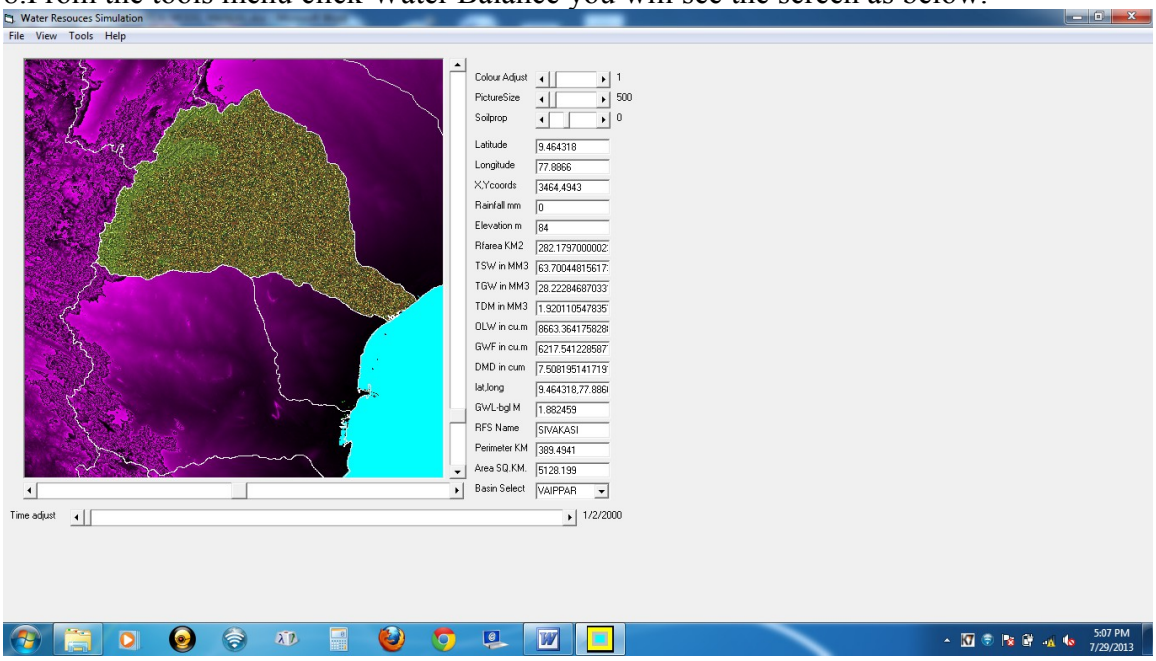
6.Now from the tools menu click on the Run over land flow simulation and you will get the screen as given below.



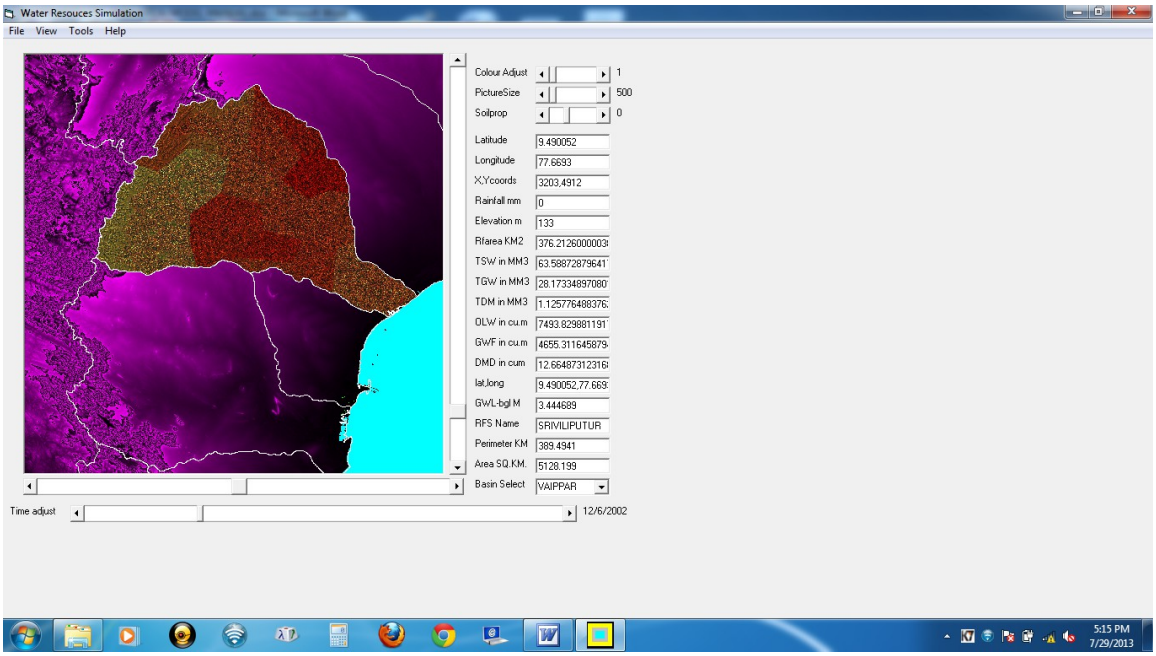
7.From the tools menu click on the Demend you will get the screen as below.



8.From the tools menu click Water Balance you will see the screen as below.

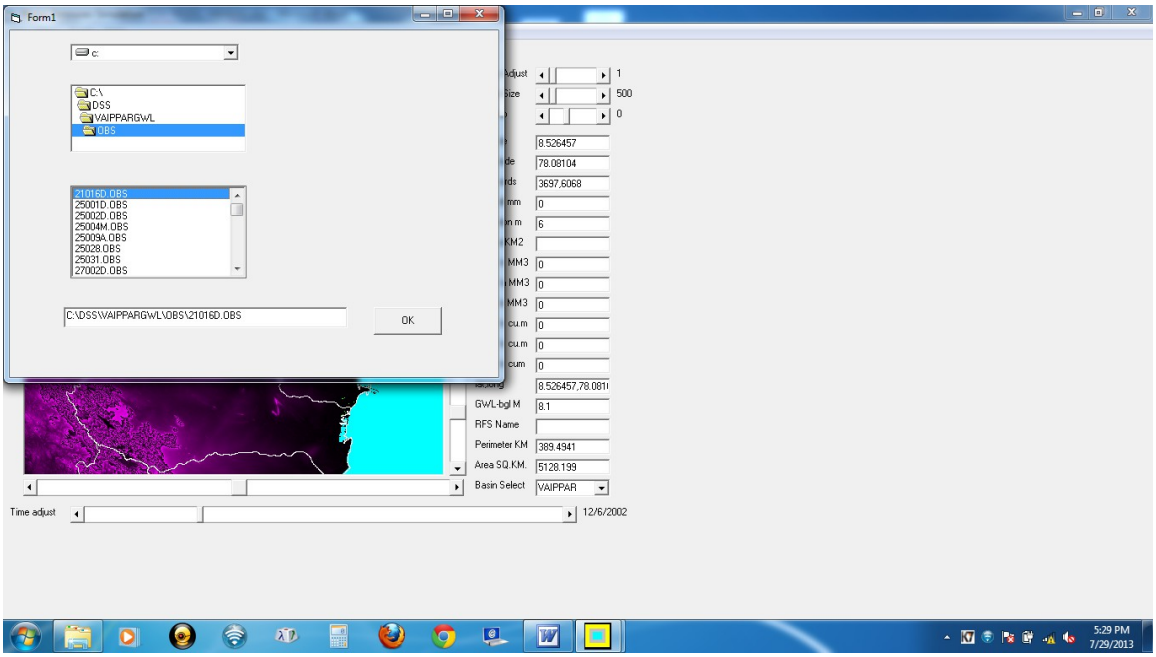


9.From the tools menu click on the Animate, you see the Date in time series will be increasing at 10days interval and correspondingly the Water balance map in Graphical area will also changing. The red color indicates demand, green and blue color indicates Ground and Surface water. You can pause animation at any time by pressing Ctrl + S . You can move the slide bar in the Time Series bar to any position to see the Availability of Water Resources in the specified time. Now you are seeing the Water Balance or water resources map on 12/6/2002 as given below.



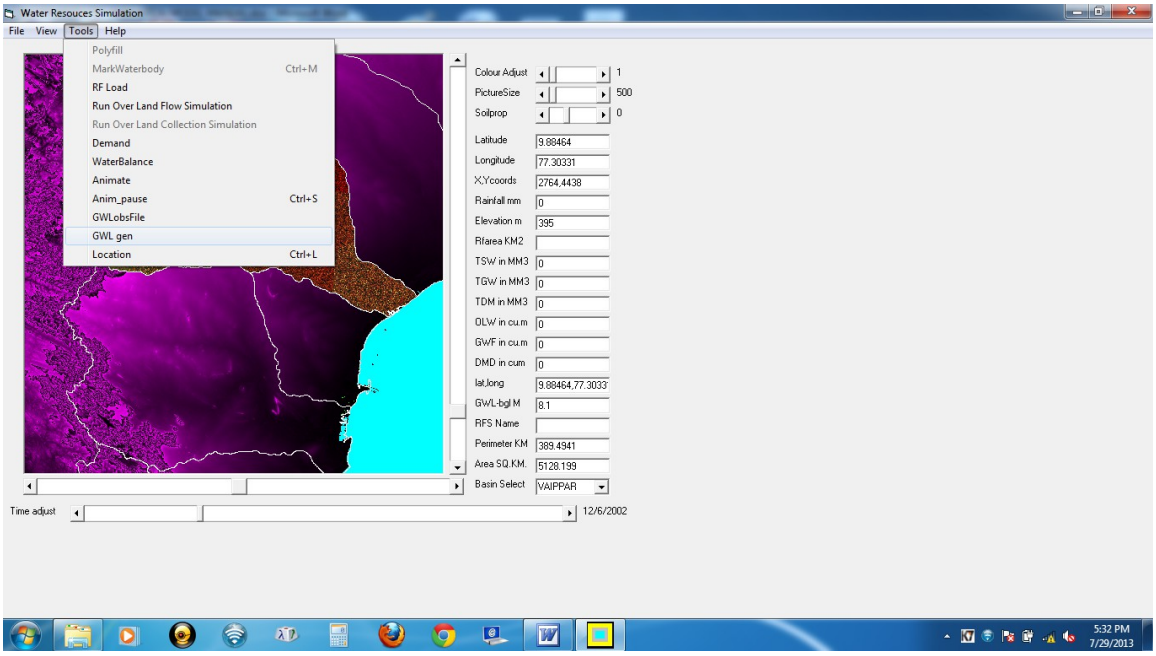
Now you will see the Label OLFMax Value is changed to [GWLbglM] . The text box adjacent to that shows the GWL below ground level at the point of mouse on the specified day in the Time series bar. Move the Time series slide bar and move the mouse over the area of interest and find the ground water levels, Availability of Ground Water, Surface Water over the current cell and subbasin areas. This is water resources simulation. Thsi model is tested for actual ground water levels observed at so many points for time series period assumed and found 90% of the values are tallying. the Observed data and Model Created data can be compared at any place.

10. From the tools menu Click the GWLobs File to select the GWL observation values file from the "VAIPPARGWL\obs\" folder as shown below.

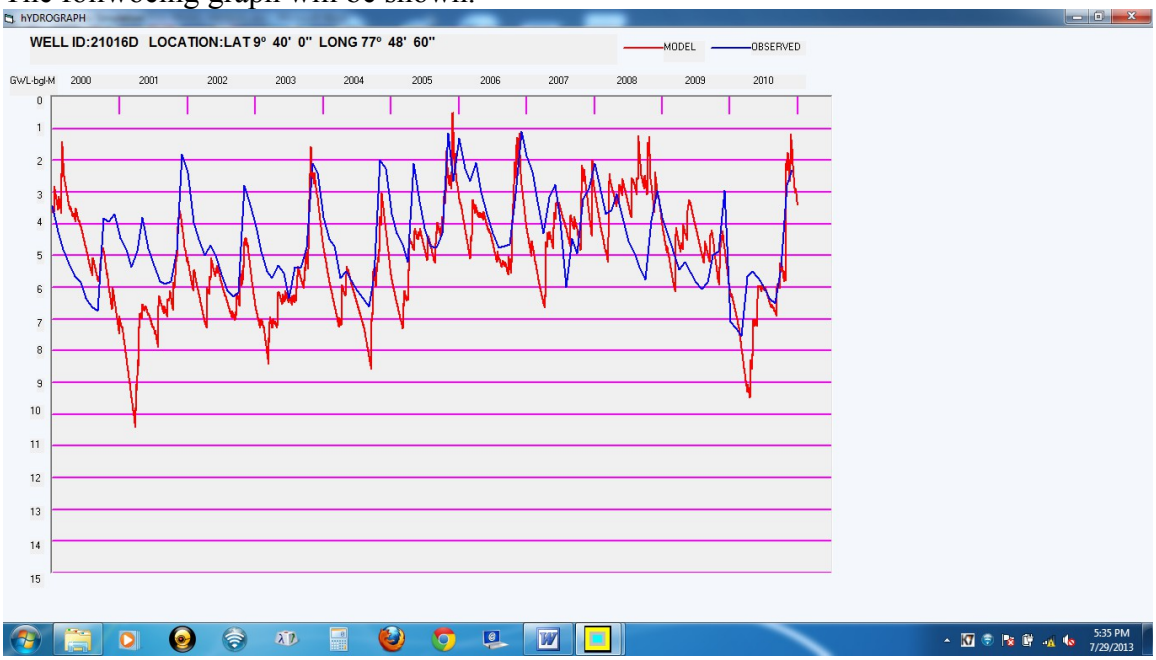


NOW CLICK OK TO SELECT "C:\DSS\VAIPPARGWL\OBS\21016D.OBS" FILE.

11.From the tools menu click GWL Gen to Generate Simulated Model Ground Water levels and Observed Ground water levels.

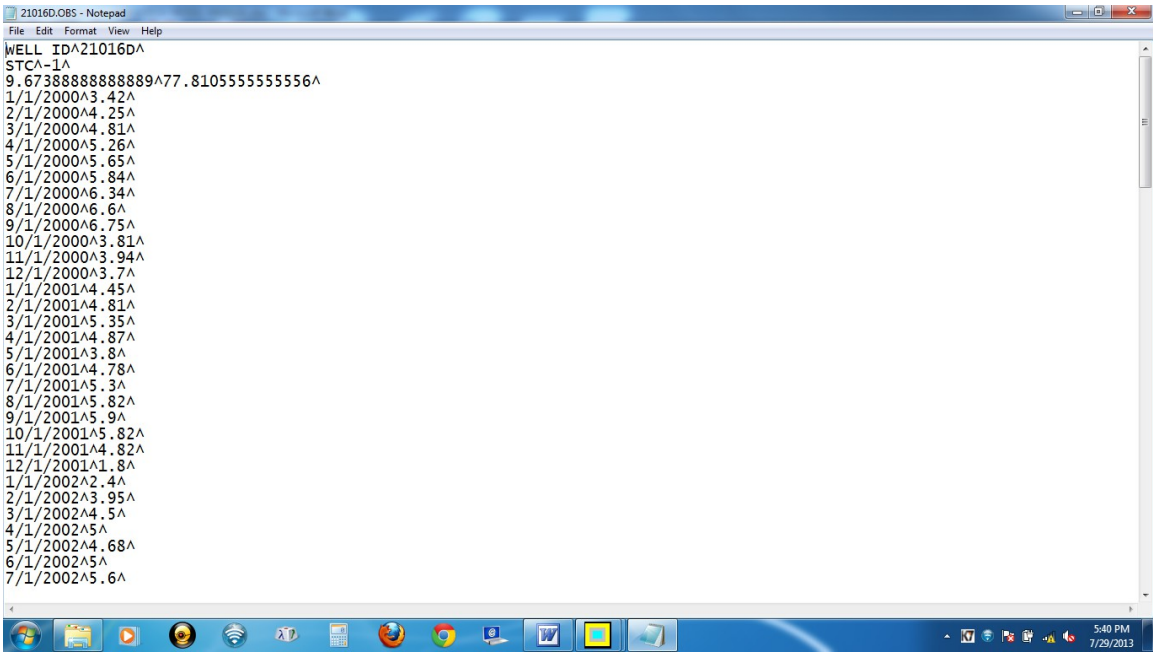


The follwoeing graph will be shown.



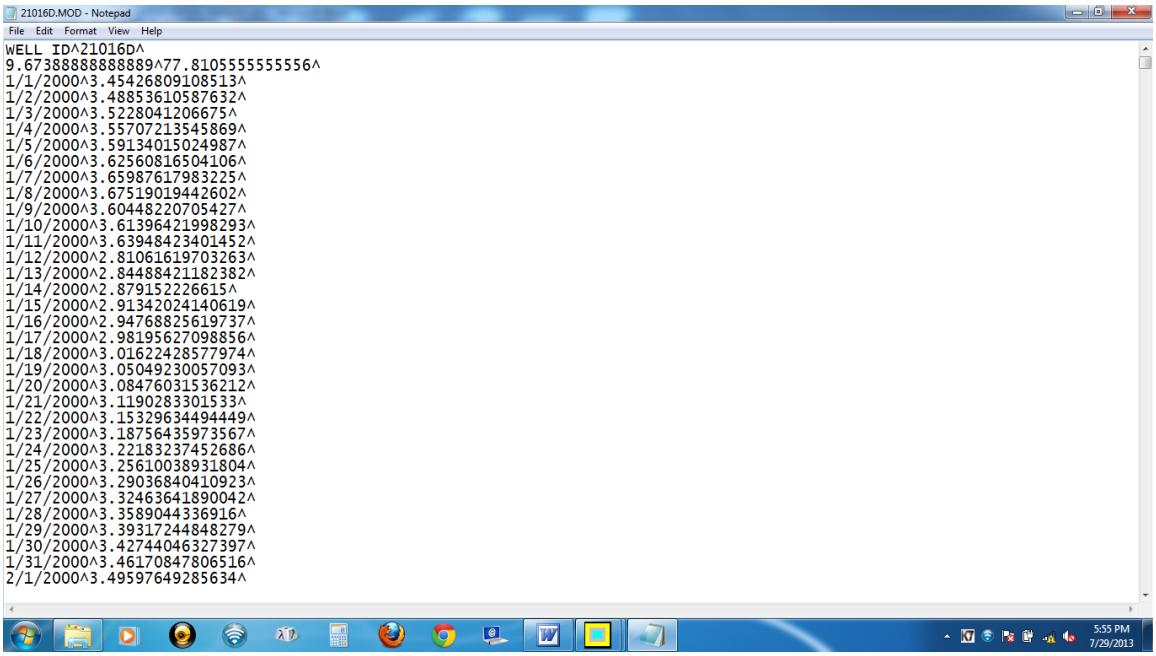
The red color indicates the model created values and Blue color indicates the observed values. You can see the observed values and Model created values by opeing the corresponding files in notepad.

C:\DSS\VAIPPARGWL\OBS\ 21016D.OBS in notepad is shown below.



The first line is WELL ID IN "WELL ID^21016D^" ^ seperated format.
The second line is SoilType Coefiicient in "STC^-1^" ^ seperated format.
Where -5 shows 20% specific water storing Capacity
-4 shows 18%, -3 shows 16%, -2 shows 14%, -1 shows 12%, 0 shows 10%, 1 shows 9.5%, 2 shows 9%, 3 shows 8.5%, 4 shows 8%, 5 shows 7.5%, 6 shows 7%, 7 shows 6.5%, 8 shows 6%, 9 shows 5.5%, 10 shows 5%.
The third line is latitude, Longitude in "9.67388888888889^77.8105555555556^" ^ seperated format.
From 4th line onwards it is observed time series data in "Date^GWLbgl M^" ^ seperated format(1/1/2000^3.42^).

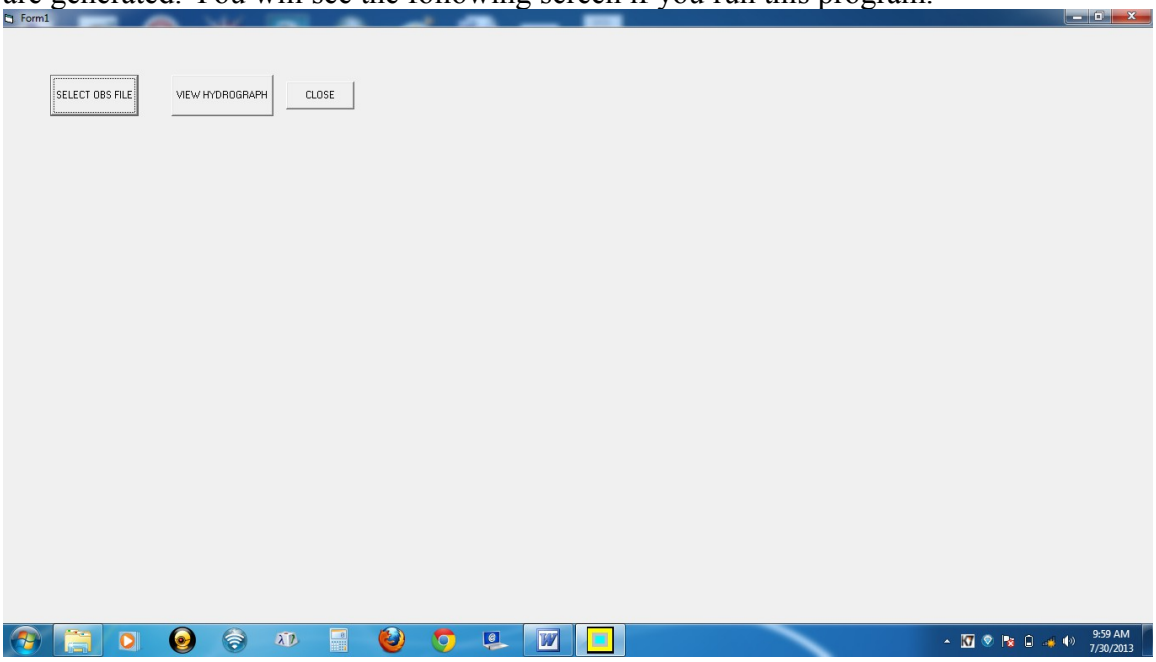
C:\DSS\VAIPPARGWL\MOD\21016D.MOD in notepad is shown below.
This file created by the Simulation model.



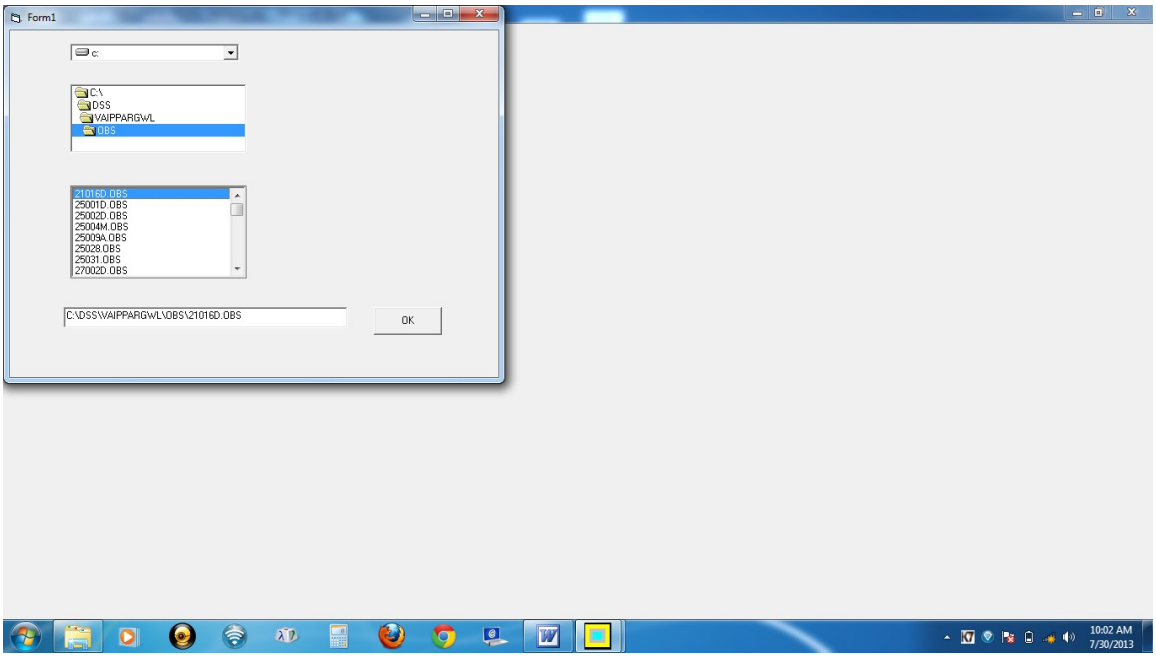
In this file first line indicates WELL ID and second line Indicates Latitude and longitude and from third line on wards it is time series model simulated GWLbgl M values.

This Water resources simulation model is calibrated for all the basins of Tamilnadu. In this Rar file only Vaippar, Tamirabarani and Agniyar basin times series datas are available. You can change the STC soil type coft. values to see the variation due to soil types.

12. You will see C:\DSS\VIEWGWL.exe file. This program is used for viewing the graphs of Observed values and model created values after the model created values are generated. You will see the following screen if you run this program.

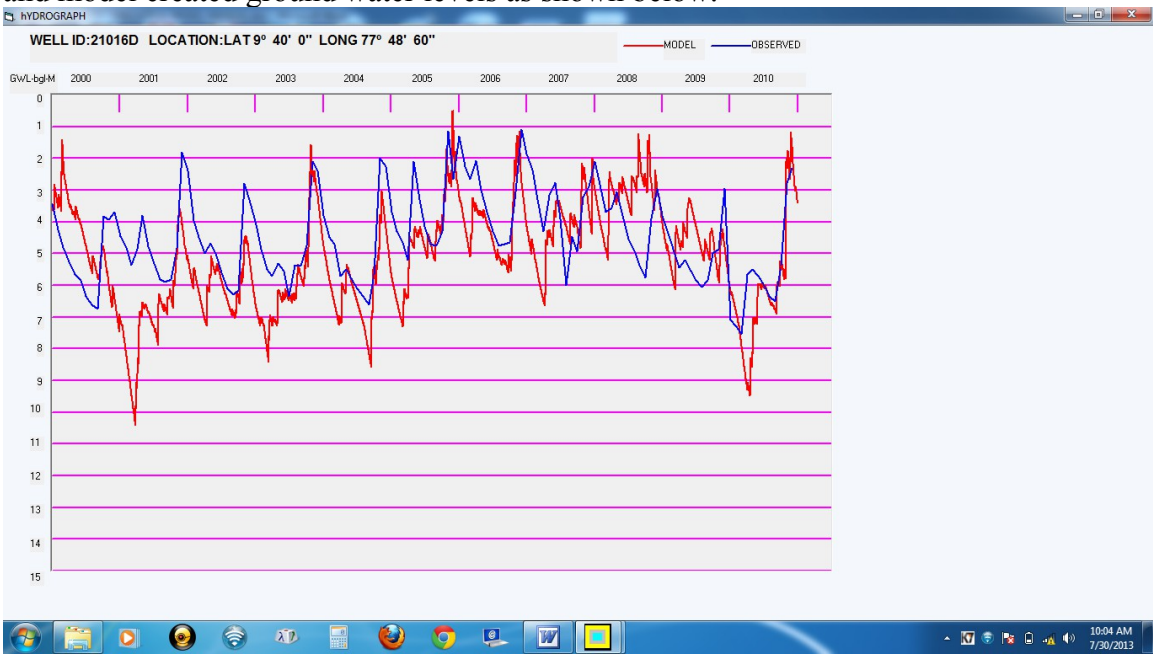


Click on the Select OBS file button. You will be prompted for selection of Observation data file as shown below. Select the same .obs file already run in the model as shown below.



Click OK after selection of the file.

Then Click on VIEWHYDROGRAPH button to see the graphical view of observed and model created ground water levels as shown below.



Try it yourself with more rainfall time series and observation wells data to test the model. If you want any doubts /queries you can contact me at mksugumaran@gmail.com